

REMARKS/ARGUMENTS

I. STATUS OF THE CLAIMS

With entry of this amendment, claims 2, 5-6, and 15-22 are canceled and claim 25 is newly added. Claims 1, 3, 4, 7-14, 23-25 are pending, and claims 1, 3, 4, 7-9, 10, 11, and 14 are currently amended. Support for the amendments can be found throughout the specification, drawings, and claims as originally filed. In particular, claims 1 and 7 are amended to replace the phrase "non-human animal" with "non-human mammal." Support for this amendment can be found for example at page 9, lines 23-28 of the specification. Claim 1 is further amended to introduce the phrase "without affecting cellular function." Support for this amendment can be found at page 15, lines 13-16 of the specification. Claim 1 is also amended to clarify that "the vector comprises the exogenous gene inserted between a first and a second ZO-1 gene fragment, wherein the first and second ZO-1 gene fragments are in the same order as that of the native ZO-1 gene." Support for this amendment can be found for example, Figures 1 and 3, wherein the order of the ZO-1 gene fragments is readily apparent and the same as that of the native ZO-1 gene.

The amendment to claim 3 merely replaces the phrase "the partial region of the ZO-1 gene" with "one of said first and second ZO-1 gene fragments" in accordance with the amendment to claim 1. Claim 4 is also amended in accordance with claim 1 to appropriately include the phrases "said first ZO-1 gene fragment comprises" and "said second ZO-1 fragment comprises." Claim 10 is amended for clarification purposes to delete the phrase "vector comprises a structure in which an."

Claim 25, directed to a linearized targeting vector comprising the in the 5' to 3' direction a first ZO-1 gene fragment, an exogenous gene, and a second ZO-1 gene fragment. Support for claim 25 can be found for example in Example 2, page 13, line 32, and in Figures 1 and 3 as originally filed. No new matter is added.

II. REJECTIONS UNDER 35 U.S.C. §112, FIRST PARAGRAPH

Claims 1-4, 7-14, 23 and 24 stand rejected under 35 U.S.C. §112, first paragraph as failing to comply with the written description requirement. The Examiner alleges that

although the specification only discloses a single species of ZO-1 gene (*i.e.* mouse ZO-1 gene) the claims when given their broadest reasonable interpretation, encompass a vector comprising a ZO-1 gene from any species of any non-human animal. As acknowledged by the Examiner, ZO-1 gene sequences from five other species were known in the art at the time of filing the instant application. The Examiner nevertheless alleges that the instant disclosure fails to demonstrate possession of the broad genus of ZO-1 genes isolated from any species, and concludes that the specification fails to provide adequate written description for the genus of ZO-1 genes encompassed by the claims. Applicants disagree.

In an effort to expedite the prosecution of the application, Applicants have amended claims 1 and 7 to replace the phrase "non-human animal" with "non-human mammal." In addition, Applicants submit a sequence alignment of the ZO-1 gene from various mammalian species including mouse, dog, rat and chimpanzee. *See, Exhibit A.* The sequence alignments clearly indicate that the genus of ZO-1 genes is not highly variable and unpredictable as alleged by the Examiner. Accordingly, the murine ZO-1 sequence, disclosed in the specification as SEQ ID NO:1, along with the other ZO-1 sequences known in the art at the time of filing the instant application constitute a representative number of species sufficient to demonstrate possession of the entire genus of ZO-1 sequences from non-human mammals, as presently claimed.

Furthermore, it is submitted that the rejection of claim 14 as failing to meet the written description requirement is improper. Specifically, claim 14 recites that the non-human mammal is a mouse. As acknowledged by the Examiner, the specification discloses the mouse ZO-1 gene as shown in SEQ ID NO 1.

In light of the arguments as presented above, and the claims as presently amended, Applicants request that the Examiner withdraw the rejections.

III. REJECTION UNDER 35 U.S.C. §102(b)

Claims 1-3, 8-12, 14, and 23 stand rejected under 35 U.S.C. §102(b) as allegedly anticipated by Itoh *et al.* (*J. Cell Biol.* (1993) 121:491-502). The Examiner alleges that Itoh *et al.* discloses a pBluescript SK(-) vector comprising (a) the entire mouse ZO-1 cDNA, including exon II, and (b) two heterologous genes (lacZ and bla(Ap^R)) each of which comprises a promoter

capable of transcribing the exogenous gene and may be considered “a marker gene expression cassette.” The Examiner further alleges that because the vector in Itoh *et al.* is circular, each gene in the vector disclosed by Itoh *et al.* can be considered to be upstream and/or downstream of every other gene in the vector. *See*, page 7, lines 6-9 of the Office Action. The Examiner thus alleges that Itoh *et al.* anticipates the invention as recited in claims 1-3, 8-12, 14 and 23 prior to entry of this amendment. Applicants disagree.

In an effort to expedite prosecution of the application, independent claim 1 is currently amended to clarify that the vector comprises the exogenous gene between a first and a second fragment of the ZO-1 gene, wherein the first and second ZO-1 gene fragments are in the same order as in the native gene.

The vector disclosed in Itoh *et al.* is a circular cloning vector in which the heterologous genes are construed by the Examiner to be both upstream and downstream of the ZO-1 gene. The targeting vector of the instant invention as presently claimed places the exogenous gene within the ZO-1 gene such that the exogenous gene is inserted between a first ZO-1 gene fragment and a second ZO-1 gene fragment, with the additional limitation that the first and second ZO-1 gene fragments are in the same order as in the native ZO-1 gene. Itoh *et al.* does not disclose such an orientation.

Because Itoh *et al.* does not disclose a vector wherein an exogenous gene is inserted between a first and a second ZO-1 gene fragment where the first and second ZO-1 gene fragments are in the same order as in the native gene, Itoh *et al.* cannot anticipate the invention as presently claimed. Therefore, independent claim 1 is patentable and not anticipated by Itoh *et al.*

Claims 2, 3, 8-12, 14 and 23 depend either directly or indirectly from independent claim 1 and include all of the limitations of independent claim 1. The arguments as presented above are also applicable to the dependent claims.

In view of the claims as amended, and the arguments as presented above, Applicants request that the Examiner withdraw the rejection.

Claim 25 is not anticipated by Itoh *et al*

As acknowledged by the Examiner, the vector in Itoh *et al.* is circular and is construed by the Examiner to be read such that each gene is both upstream and downstream of every other gene on the vector as discussed above. Claim 25 is directed to a linear targeting vector wherein the exogenous gene is between a first and a second ZO-1 gene fragment. The linear vector only allows for a single orientation such that each gene on the vector is either be upstream or downstream from every other gene on the vector, not both. Because Itoh *et al.* does not disclose a linearized vector, as presently recited in independent claim 25, Itoh *et al.* cannot anticipate claim 25. Therefore, claim 25 is patentable and not anticipated by Itoh *et al.*

IV. REJECTION UNDER 35 U.S.C. §103(a)

A. Claims 1 and 7 are patentable and not obvious over Flemming *et al.* (Devel. (1991) 113:295-304) in view of LeMouellic *et al.* (Proc. Natl. Acad. Sci. (1990) 87:4712-4716) and Itoh *et al.*

Claims 1 and 7 stand rejected under 35 U.S.C. §103(b) as allegedly being obvious and unpatentable over Flemming *et al.* in view of LeMouellic *et al.* and Itoh *et al.* The Examiner cites Flemming *et al.* as allegedly teaching a method of investigating ZO-1 expression in embryos using an antibody against the ZO-1 protein. The Examiner cites LeMouellic *et al.* as allegedly disclosing a method of following tissue expression of a gene by inserting a marker gene into a targeting vector and integrating the targeting vector into an endogenous gene such that the endogenous gene is inactivated and the marker gene is placed under the control of the endogenous promoter. The Examiner cites Itoh, *et al.* as allegedly teaching the sequence of the mouse ZO-1 gene. In supporting the *prima facie* case, the Examiner concludes that it would have been obvious to substitute the reporter gene assay of LeMouellic *et al.* for the immunohistochemistry method of Flemming *et al.* using the mouse ZO-1 gene disclosed by Itoh *et al.* to arrive at a targeting vector as claimed in the instant invention. Applicants disagree.

As discussed above, Itoh *et al.* does not teach or suggest a targeting vector having the orientation as presently recited in claim 1, wherein the exogenous gene is inserted between a first and a second ZO-1 gene fragments, and wherein the first and second ZO-1 gene fragments

are in the same order as in the native gene as presently claimed. Furthermore, neither Flemming *et al.* nor LeMouellic *et al.* cure this defect. Therefore, the combination of the cited references do not teach or suggest all of the elements of independent claim 1 as presently recited, and therefore the rejection is improper.

Assuming arguendo, that the combined teachings of the cited references did support a *prima facie* case of obviousness, which the applicants contest, the present invention provides for surprising results that are not taught nor suggested by the prior art.

As disclosed in the instant specification at page 1, lines 20-21, "frequency of homologous recombination is generally very low *i.e.*, only about 0.1 to 1% in cells that have been introduced with the exogenous gene." Indeed, LeMouellic *et al.* confirms this teaching that "homologous recombination can be a rather rare event." *See*, Lemouellic *et al.* page 4713, right column lines 14-15. The present inventors have surprisingly discovered for the first time that high efficiency gene targeting can be achieved by making the ZO-1 gene a target site for introducing exogenous genes. The gene targeting vector of the instant invention enables homologous recombination with a 90% or higher probability without affecting cellular function. *See*, page 2, lines 12-13 of the specification. The targeting vector of the instant invention overcomes drawbacks associated with the conventional methods of generating transgenic mice, in particular the low frequency of homologous recombination events and the difficulty of expressing the exogenous gene without affecting cellular function.

Even if a skilled artisan were motivated to investigate the function of a ZO-1 gene based on the teachings of Flemming *et al.* to produce a targeting vector comprising the mouse ZO-1 gene sequence disclosed in Itoh *et al.* using the method of LeMouellic *et al.* in view of the technical knowledge at the time of filing, the skilled artisan would not expect the probability of homologous recombination to be at least 90% as achieved by the targeting vectors of the instant invention.

Independent claim 1 is patentable and not obvious over the cited references because the combination of the cited references do not teach nor suggest all of the limitations of independent claim 1 as presently recited, nor do the cited references teach or suggest the

surprising discovery that homologous recombination with a 90% or higher probability can be achieved using the targeting vectors of the instant invention.

Claim 7 depends from independent claim 1, and includes all of the limitations of independent claim 1. Therefore, the arguments as presented above are also applicable to dependent claim 7.

In view of the claims as presently amended, and the arguments as presented above, Applicants request that the Examiner withdraw the rejection.

B. Claims 1-3, 7-12, 14 and 23 are patentable and not obvious over Capecchi *et al.* (*Scientific American* (1994) 270:34-41) and Itoh *et al.*

Claims 1-3, 7-12, 14 and 23 stand rejected under 35 U.S.C. §103(a) as allegedly being anticipated by Capecchi and Itoh. The Examiner cites Capecchi *et al.* as teaching the generation of a mouse whose genome comprises a disruption in the HoxA-3 gene using targeting vectors comprising a first and a second polynucleotide sequences homologous to the target gene (HoxA-3) and a selectable marker. The Examiner alleges that Capecchi *et al.* merely differs from the instant invention in that it does not disrupt the ZO-1 gene. The Examiner relies on Itoh *et al.* as curing this defect. The Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the method of Capecchi *et al.* to disrupt the ZO-1 gene as disclosed by Itoh *et al.* to arrive at the Applicant's invention. Applicants disagree.

As Capecchi *et al.* acknowledges at page 38 bottom of right column to page 39 left col., line 5, it was recognized in the art at the time the present application was filed that targeted replacement occurs only in a small fraction of treated cells. Therefore, even if the skilled artisan were motivated to combine the teachings of Capecchi *et al.* to the ZO-1 gene as disclosed by Itoh *et al.*, the skilled artisan would not expect to produce a targeting vector as presently recited in independent claim 1 that displays the surprising results of enabling homologous recombination with a 90% or higher probability without affecting cellular function as discussed above in sections III and IV(A).

Claims 2-3, 7-12, 14 and 23 depend either directly or indirectly from independent claim 1, and include all of the limitations of independent claim 1. Therefore, the arguments as presented above with regard to independent claim 1 are also applicable to the dependent claims.

In light of the claims as presently recited and the arguments presented herein, Applicants request that the Examiner withdraw the rejection.

C. Claims 13 and 24 are patentable and not obvious over Capecchi *et al.*, in view of Itoh *et al.*, and in further view of Blake *et al.* (*Biotechniques* (1997) 23:690-695).

Claims 13 and 24 stand rejected under 35 U.S.C. §103(a) as allegedly being obvious and unpatentable over Capecchi *et al.* in view of Itoh *et al.* in further view of Blake *et al.* The Examiner alleges that it would have been obvious to one of ordinary skill in the art to substitute the neomycin resistance gene utilized by Capecchi *et al.* with the β -geo marker gene disclosed by Blake *et al.* because they are equivalent alternatives known at the time of the invention. Applicants disagree.

Claims 13 and 24 depend either directly or indirectly from independent claim 1 and include all of the limitations of independent claim 1. As discussed above, Capecchi *et al.* and Itoh *et al.* do not render independent claim 1 obvious or unpatentable, and these arguments are also applicable to dependent claims 13 and 24. Blake *et al.* does not cure the defects of Capecchi *et al.* and Itoh *et al.* as discussed above. Therefore the combination of the references do not render dependent claims 13 and 24 obvious or unpatentable over the cited references.

In light of the claims as presently amended, and the arguments as presented herein, Applicants request that the Examiner withdraw the rejection.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 415-576-0200.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Robert C. Burrows", written in a cursive style.

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61482565 v1

EXHIBIT A

***** [align] *****

options = -align -type=dna -matrix=blosum -gapdist=8 -maxdiv=40 -outorder=input -gapopen=15 -gapext=6.66 -pw

CLUSTAL W (1.83) Multiple Sequence Alignments

Sequence type explicitly set to DNA

Sequence format is Pearson

Sequence 1: mouseZ0-1 7046 bp

Sequence 2: ratZ0-1 6614 bp

Sequence 3: dogZ0-1 6805 bp

Sequence 4: chimpanzeeZ0-1 7253 bp

Start of Pairwise alignments

Aligning...

Sequences (1:2) Aligned. Score: 94

Sequences (1:3) Aligned. Score: 85

Sequences (1:4) Aligned. Score: 82

Sequences (2:3) Aligned. Score: 87

Sequences (2:4) Aligned. Score: 88

Sequences (3:4) Aligned. Score: 89

Start of Multiple Alignment

There are 3 groups

Aligning...

Group 1: Sequences: 2 Score:118975

Group 2: Sequences: 2 Score:120536

Group 3: Sequences: 4 Score:113507

Alignment Score 242177

query.aln

CLUSTAL W (1.83) multiple sequence alignment

mouseZ0-1	CGCCTGAGTTGCCCGCGACGGCTCTGCCCGCGACGGCACGTCTCTCGGCGGCCGCGCGT
ratZ0-1	_____
dogZ0-1	_____
chimpanzeeZ0-1	_____

mouseZ0-1	TCCGGGGAAGTTACGTGCGGGAGCAGGCTTTGGAGGAGACGCCCGAGGGTGTAGGGGACA
ratZ0-1	_____
dogZ0-1	_____
chimpanzeeZ0-1	_____

mouseZ0-1	GCCGGAGGCCCGGGTACTGCGGAGCGGCGAGCCGGCGGAGGGCGGCGGAGGCCGAGCAGG
ratZ0-1	_____
dogZ0-1	_____
chimpanzeeZ0-1	_____

mouseZ0-1	CGGCCGGGTGTGCCCGCGGAGAAGCCGGGCGGGGCGGACGCTTCCGGACTTTTGTCC
ratZ0-1	_____
dogZ0-1	_____
chimpanzeeZ0-1	-CCGCGAGCGAGCGGGACAAGATGAGTACCAGAATACCTGACGGTGCTGCAGATGGCCAT

mouseZ0-1	CAC TTGAATCCCCTCCCGTGGGCGGGCCTTTCCGGCCTCCCCGCCCCTGCCCGCTC
ratZ0-1	_____
dogZ0-1	_____
chimpanzeeZ0-1	CGGCGTCACCCCTCCAACCGCGGCAGCCTCTGCCGCTCAAGAGGAAGCTGTGGGTAAC

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mouseZ0-1      GTCCCCGGGAGATGTTTATGCGGACGGTGCGGTGAGGAGCGGGCGGGCGGGCGGCGGA
ratZ0-1
dogZ0-1
chimpanzeeZ0-1 GCCATCCTCTGAAAATCCTAATGGTGCTACTTCTAGTGTGAGCCAAGGAAAACCTCTTT

mouseZ0-1      GTTTCGGGTCGGAGGAGCTTCGGCGGGCGGGAGAGAGACAAGATGTCCGCCAGGGCGGC
ratZ0-1
dogZ0-1          -----GAGAGAGACAAGATGTCCGCCAGAGCTGC
chimpanzeeZ0-1  AAGACGAATTAAGGGAGATTACACAGAA-----GCAAAAGCCTTGATAGCATGGATTTCGTG

mouseZ0-1      GGCGCGTAAGAGCACAGCAATGGAGGAAACAGCTATATGGGAACAGCACACAGTGACGCT
ratZ0-1          -----AGAGCACAGCAATGGAGGAAACAGCTATATGGGAACAGCACACAGTGACGCT
dogZ0-1      GGCGCGCAAGAACACAGCAATGGAGGAAACAGCTATATGGGAACAACACACAGTGACGCT
chimpanzeeZ0-1 GAGC-TCACTAGCACAGCAATGGAGGAAACAGCTATATGGGAACAACATACAGTGACGCT
                * ***** **

mouseZ0-1      TCACAGGGCTCCTGGGTTTGGATTGGAATTGCAATCTCTGGTGAAGAGATAATCCTCA
ratZ0-1      TCACAGGGCTCCTGGGTTTGGATTGGAATTGCAATATCTGGTGAAGAGATAATCCTCA
dogZ0-1      TCACAGGGCAGCTGGATTGGAATTGGAATTGCAATCTCTGGTGAAGAGATAACCTCA
chimpanzeeZ0-1 TCACAGGGCTCCTGGATTGGAATTGGAATTGCAATATCTGGTGGACGAGATAATCCTCA
                *****

mouseZ0-1      TTTTCAGAGTGGGGAACCTCCATAGTGATTCTGATGTGTTAAAGGAGGGCCAGCTGA
ratZ0-1      TTTTCAGAGTGGGGAACCTCCATAGTGATTCTGATGTGCTAAAAGGAGGGCCAGCTGA
dogZ0-1      TTTTCAGAGTGGAGAACTCCATAGTAATTCAGATGTGCTGAAAGGGGACCTGCTGA
chimpanzeeZ0-1 TTTTCAGAGTGGGGAACGTCAATAGTGATTTCAGATGTGCTGAAAGGAGGACCAGCTGA
                *****

mouseZ0-1      AGGACAGCTACAGGAAAATGACCGAGTTGCAATGGTTAACGGAGTTTCAATGGATAACGT
ratZ0-1      AGGACAGCTACAGGAAAATGACCGAGTCGCAATGGTTAACGGAGTTTCAATGGATAATGT
dogZ0-1      AGGACAGCTACAGGAAAATGACCGAGTTGCAATGGTTAACGGAGTTTCAATGGATAATGT
chimpanzeeZ0-1 AGGACAGCTACAGGAAAATGACCGAGTTGCAATGGTTAACGGAGTTTCAATGGATAATGT
                *****

mouseZ0-1      TGAACATGCTTTTGCTGTTTCAGCAGCTAAGGAAGAGTGGGAAAAACGCAAAATTACTAT
ratZ0-1      TGAACATGCTTTTGCTGTTTCAGCAGCTAAGGAAGAGTGGGAAAAACGCAAAATTACCAT
dogZ0-1      TGAACATGCTTTTGCTGTTTCAGCAACTAAGGAAGAGTGGGAAAGATGCAAAATTACCAT
chimpanzeeZ0-1 TGAACATGCTTTTGCTGTTTCAGCAACTAAGGAAGAGTGGGAAAAATGCAAAATTACAA
                *****

mouseZ0-1      CCGAAGGAAGAAGAAAGTTGAGATCCCTGTAAGTCACCCAGATCCTGAGCCGGTGCTGA
ratZ0-1      CCGAAGGAAGAAGAAAGTTGAGATCCTGTAAGTCACCCAGACCTGACCCAGTGCTGA
dogZ0-1      CCGGAGAAAGAAGAAAGTTGAGATACCAAGTATGTCGTCCTGATCCTGAACCAAGTGCTGA
chimpanzeeZ0-1 TAGAAGGAAGAAGAAAGTTCAAATACCAAGTAAAGTCGTCCTGATCCTGAACCAAGTATGTA
                ** *****

mouseZ0-1      TAATGAAGACGATAGTTATGACGAAGAAGTGATGACCCAAGAGCTGGCCGCGGTGCTTT
ratZ0-1      TAATGAAGATGATAGCTATGACGAGGATGTGCAGGATCCAAGAAGTGGCCGAGGTGCCCT
dogZ0-1      GAATGAAGA-----TAGTTATGATGAGGAAGTCCATGACCCAAGAAGCAGCCGTGGTGGTCT
chimpanzeeZ0-1 TAATGAAGAAGATAGTTATGATGAGGAATACATGATCCAAGAAGTGGCCGAGTGCTGT
                *****

mouseZ0-1      AGCGAACAAGAAGGAGCGAGAAGAGCTGGGCAAGGGATAGGAGTGCAAGCAGGGAGAGGAG
ratZ0-1      AGCTAACAGAAGGGGTGAGAAGAGCTGGGCAAGGGATAGAAGCGCAAGCAGGGACCGGAG
dogZ0-1      GGTCAAGTGAAGGAGTGAGAAGAGTTGGGCAAGGGACAGGAGTGCAAGCAGAGAGAGGAG
chimpanzeeZ0-1 GGTTAACAGAAGGAGTGAGAAGAGTTTGGCCGAGGGATAGAAGTGCAAGTGAAGAGAGGAG
                * * *****

mouseZ0-1      CCTGTCCCTCGCTCGGACAGGCGGTCGGTGGCCTCCAGTCAGCCCGCAAAGCCACCAA
ratZ0-1      CCTGTCCCTCGCTCAGACAGGCGATCAGTGGCCTCCAGTCAGCCCGCCAAACCCACCAA
dogZ0-1      TTTGTCTCCACGGTCTGATAGGGGATCTGTGGCCTCCAGTCAACCTCCCAACCTACCAA
chimpanzeeZ0-1 CTTGTCCCGCGGTGAGACAGGCGGTCAGTGGCTTCCAGCCAGCCGCTAAACCTACTAA
                *****

mouseZ0-1      GGTCACTGTTGAAGTCTCGGAAAAATGAAGAATATGGTCTTCGACCGGCCAGCCACAT
ratZ0-1      GGTCAATTGGTGAAGTCTCGGAAAAATGAAGAATATGGTCTTCGATTGGCCAGCCATAT

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dogZ0-1      AGTCACATTGGTGAAATCCCGGAAAAATGAAGAATATGGTCTTCGATTGGCCAGCCATAT
chimpanzeeZ0-1 AGTCACACTGGTGAAATCCCGGAAAAATGAAGAATATGGTCTTCGATTGGCAAGCCATAT
*****

mouseZ0-1    ATTTGTAAGGAAATTTACAAGATAGTTTGGCAGCAAGAGATGGTGACATTCAAGAAGG
ratZ0-1      ATTTGTAAGGAAATTTACAAGATAGTTTGGCAGCAAGAGATGGTAACATTCAAGAAGG
dogZ0-1      ATTTGTAAGGAAATTTACAAGATAGTTTGGCAGCAAGAGATGGCAATATTCAAGAAGG
chimpanzeeZ0-1 ATTTGTAAGGAAATTTACAAGATAGTTTGGCAGCAAGAGATGGCAATATTCAAGAAGG
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mouseZ0-1    GGATGTTGTCTTGAAGATAAATGGTACTGTGACAGAAAATATGTCATTGACAGATGCAAA
ratZ0-1      GGATGTTGTCTTGAAGATAAATGGTACTGTGACAGAAAATATGTCATTGACAGATGCAAA
dogZ0-1      CGATGTTGTATTAAAGATAAATGGTACTGTGACAGAAAATATGTCATTGACAGATGCAAA
chimpanzeeZ0-1 TGATGTTGTATTGAAGATAAATGGTACTGTGACAGAAAATATGTCATTGACAGATGCAAA
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mouseZ0-1    AACACTGATAGAAAGGTCTAAAGGCAAGTTAAAAATGGTAGTGCAAAGAGATGAGCGGGC
ratZ0-1      AACATTGATAGAAAGGTCTAAAGGCAAGTTAAAAATGGTAGTGCAAAGAGATGAGCGGGC
dogZ0-1      GACTTTGATAGAAAGATCTAAAGGCAAGTTAAAAATGGTAGTTCAAAGGATGAACGGGC
chimpanzeeZ0-1 GACATTGATAGAAAGGTCTAAAGGCAATTAAAAATGGTAGTTCAAAGAGATGAACGGGC
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mouseZ0-1    TACCTTACTGAACGTCCTGACCTTTCCGATAGTATCCATTCTGCTAATGCCTCGGAAAG
ratZ0-1      TACCTTATTGAATGTCCTGATCTTTCAGATAGTATCCATTCTGCTAATGCCTCTGAAAG
dogZ0-1      TACCCTATTGAATGTCCTGATCTTTCGACAGTATCCACTCTGCTAATGCTTCTGAGAG
chimpanzeeZ0-1 TACGCTATTGAATGTCCTGATCTTTCGACAGCATCCACTCTGCTAATGCCTCTGAGAG
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mouseZ0-1    AGATGACATTTCAGAAATTCAGTCACTAGCGTCAGACCATTGAGGTCGCTCGCATGACAG
ratZ0-1      AGATGACATTTCAGAAATTCAGTCACTAGCATCAGACCATTGAGTTCGCTCCCATGACAG
dogZ0-1      AGATGATATTTCAGAAATTCAGTCACTGGCATCAGATCATTCTGGTCGATCACATGATAG
chimpanzeeZ0-1 AGACGACATTTCAGAAATTCAGTCACTGGCATCAGATCATTCTGGTCGATCACACGATAG
*****

mouseZ0-1    GCCACCCCGCCGAGCCAGTCACGATCTCCTGACCAACGTTGAGAGCCCTCCGATCATTG
ratZ0-1      GCCTCCCGCCGGAAGCCAGTCACGATCTCCCGACCAACGTTGAGAGCCCTCTGATCATTG
dogZ0-1      ACCTCCCGCCGACAGCCGGTCACGGTCACCTGACCAACGATCAGAGCCTTCTGATCATTG
chimpanzeeZ0-1 GCCTCCCGCCGCGAGCCGGTCACGATCTCCTGACCAACGTTGAGAGCCTTCTGATCATTG
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mouseZ0-1    CACGCACTCTCCACAGCAGCCAGCAATGGCAGTCTCCGGAGCAGAGAGGAAGAGCGAAT
ratZ0-1      CACACAGTCTCCACAGCAGCCAGCAATGGCAGTCTCCGGAGCAGAGAGGAAGAGCGCAT
dogZ0-1      CAGACACTCTCCACAGCAGCCAGCAGTGGCAGTCTCCGGAGCAGAGAGGAAGAGAGAAT
chimpanzeeZ0-1 CAGGCACTCGCCACAGCAGCAAGCAATGGCAGTCTCCGGAGTAGAGATGAAGAGAGAAT
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mouseZ0-1    GTCTAAACCTGGGGCATCTCAACTCCTGTAAACATGTAGACGATCATCCACCCAAAGC
ratZ0-1      GTCTAAACCCGGGGCTGTCTCAACTCCTGTAAACATGTAGATGATCATACACCCAAAGC
dogZ0-1      TTCTAAACCTGGGGCTGTCTCAACTCCTGTAAAGCATGCAGATGATCATACATATAAAC
chimpanzeeZ0-1 TTCTAAACCTGGGGCTGTCTCAACTCCTGTAAAGCATGCTGATGATCACACCTATAAAC
*****

mouseZ0-1    AGTGGAAGAAGTTACAGTTGAGAAAAATGAGAAGCAGACGCCACTCTTCCAGAACCGAA
ratZ0-1      AGTGGAAGAAGTTACAGTTGAAAAACATGAGAAGCAGACGCCACTCTTCCAGAACCAAA
dogZ0-1      AGTAGAAGAAGTTGAGTTGAGAGAAATGAGAAACAAGCACCCAGTCTTCCAGAACCAAA
chimpanzeeZ0-1 AGTGGAAGAAGTTACAGTTGAAAGAAATGAGAAACAACACCTTCTTCCAGAACCAAA
*****

mouseZ0-1    ACCTGTGTATGCTCAAGTTGGACAACCAGATGTGGATTTACCCGTCAGCCCTTCTGATGG
ratZ0-1      ACCTGTATATGCTCAAGTGGACAGCCAGATGTGGATTTACCTGTGAGCCCTTCTGATGG
dogZ0-1      GCCTGTGTATGCTCAAGTTGGACAACCAGATGTGGATTTACCTGTGAGTCCATCTGATGG
chimpanzeeZ0-1 GCCTGTGTATGCCAAGTTGGGAGCCAGATGTGGATTTACCTGTGAGTCCATCTGATGG
*****

mouseZ0-1    TGCTCTGCCTAATTCAGCTCATGAAGACGGGATACTTAGGCCAGCATGAAACTGGTAAA
ratZ0-1      TGTTCCTGCCAATTCACACATGAAGATGGGATTCTTAGGCCAGCATGAAACTGGTAAA
dogZ0-1      CGTCCTACCTAATTCACCTCATGAAGATGGGATTCTCGGCCAGCATGAAATTGGTAAA
chimpanzeeZ0-1 TGTCCTACCTAATTCACCTCATGAAGATGGGATTCTCGGCCAGCATGAAATTGGTAAA
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mouseZ0-1      ATTCAGAAAAGGAGATAGTGTGGGTTTGGCGACTAGCTGGTGGAAATGATGTCGGAATATT
ratZ0-1        ATTCAGAAAAGGAGATAGTGTGGGTTTGGCGACTAGCTGGTGGAAATGATGTCGGAATATT
dogZ0-1        ATTCAGAAAAGGAGATAGTGTGGGCTTGGCGCTGGCTGGTGGAAATGATGTTGGAATATT
chimpanzeeZ0-1 ATTCAGAAAAGGAGATAGTGTGGGTTTGGCGCTGGCTGGTGGAAATGATGTTGGAATATT
*****

mouseZ0-1      TGTAGCTGGCGTTCTAGAAGATAGCCCTGCAGCCAAAGAAGGCTTAGAGGAAGGTGATCA
ratZ0-1        TGTAGCTGGCGTTCTAGAAGATAGCCCTGCAGCCAAAGAAGGCTTAGAGGAAGGTGATCA
dogZ0-1        TGTAGCTGGTGTCTAGAAGATAGCCCTGCAGCCAAAGAAGGCTTAGAAGAGGGTGATCA
chimpanzeeZ0-1 TGTAGCTGGCGTTCTAGAAGATAGCCCTGCAGCCAAAGAAGGCTTAGAGGAAGGTGATCA
*****

mouseZ0-1      AATTCTCAGGGTGAACAATGTAGATTTACAAATATCATAAGGGAAGAGGCCGTCCTTTT
ratZ0-1        AATTCTCAGGGTGAACAATGTAGATTTACAAATATCATAAGAGAAGAAGCTGTTCTTTT
dogZ0-1        AATTCTCAGGGTAAACAATGTAGATTTACAAACATCATAAGAGAAGAAGCCGTCCTTTT
chimpanzeeZ0-1 AATTCTCAGGGTAAACAAGCTAGATTTTACAAATATCATAAGAGAAGAAGCCGTCCTTTT
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mouseZ0-1      CCTCCTTGACCTCCCTAAAGGTGAAGAAGTGACCATACTGGCTCAGAAGAAGAAGGACGT
ratZ0-1        CCTCCTCGACCTCCCTAAAGGTGAAGAAGTGACCATATTGGCTCAGAAGAAAAGGACGT
dogZ0-1        CCTACTCGACCTCCCTAAAGGAGAAGAAGTGACCATATTGGCTCAGAAGAAGAAGATGT
chimpanzeeZ0-1 CCTGCTTGCATCCCTAAAGGAGAAGAAGTGACCATATTGGCTCAGAAGAAGAAGGATGT
*****

mouseZ0-1      TTATCGCCGCATTGTAGAATCAGATGTAGGAGATTCATTCTATATTAGAACGCATTTTGA
ratZ0-1        TTATCGCCGCATTGTAGAGTCAGATGTAGGAGACTCGTTCTATATTAGAACACATTTTGA
dogZ0-1        TTATCGTCGCATTGTAGAATCAGATGTGGGAGATTCITTCTATATTAGAACCCACTTTGA
chimpanzeeZ0-1 TTATCGTCGCATTGTAGAATCAGATGTAGGAGATTCITTCTATATTAGAACCCATTTTGA
*****

mouseZ0-1      ATATGAAAAAGAATCTCCTTACGGACTTAGTTTTAACAAAGGAGAGGTGTTCCGGGTCGT
ratZ0-1        ATATGAGAAAGAATCTCCTTATGGACTCAGTTTTAACAAAGGAGAGGTGTTCCGGGTCGT
dogZ0-1        ATATGAAAAGGAATCTCCTACGGACTTAGTTTTAACAAAGGAGAGGTGTTCCGTGTTGT
chimpanzeeZ0-1 ATATGAAAAGGAATCTCCTATGGACTTAGTTTTAACAAAGGAGAGGTGTTCCGTGTTGT
*****

mouseZ0-1      GGATACTTTTATACAAATGGAAGCTGGGCTCTTGGCTTGCATTGGAATTGGCAAAAATCA
ratZ0-1        GGACACCCCTGTACAACGGGAAGCTGGGCTCCTGGCTGGCCATTGGAATTGGCAAAAATCA
dogZ0-1        GGATACCTTTGTACAATGGGAACTAGGCTCTTGGCTCGCTATTGGAATTGGCAAAAATCA
chimpanzeeZ0-1 GGATACCTTTGTACAATGGAAGCTGGGCTCTTGGCTGCTATTGGAATTGGTAAAAATCA
*****

mouseZ0-1      TAAGGAGGTAGAACGAGGCATCATCCCAAATAAGAACAGAGCTGAACAGTTAGCCAGTGT
ratZ0-1        CAAGGAGGTAGAGCGAGGCATCGTTCCCTAATAAGAACAGAGCCGAGCAGTTAGCCAGTGT
dogZ0-1        TAAAGAAGTAGAACGAGGCATCATCCCTAATAAGAACAGGGCTGAGCAGTTAGCCAGTGT
chimpanzeeZ0-1 TAAGGAGGTAGAACGAGGCATCATCCCTAATAAGAACAGAGCTGAGCAGTAGCCAGTGT
*****

mouseZ0-1      ACAGTACACACTTCCAAAGACAGCGGGTGGTGATCGGGCAGACTTCTGGAGGTTTCGAGG
ratZ0-1        ACAGTACACACTTCCAAAGACAGCAGGTGGCGATCGGGCAGACTTCTGGAGGTTTCGAGG
dogZ0-1        ACAGTACACACTTCCAAAACAGCTGGGGGAGACCGTGCTGACTTCTGGAGATTCCGGGG
chimpanzeeZ0-1 ACAGTATACACTTCCAAAACAGCAGGCGGAGACCGTGCTGACTTCTGGAGATTGAGGG
*****

mouseZ0-1      TCTTCGCAGCTCCAAGAGAAATCTTCGAAAAGCAGAGAGGACTTGTCAGCTCAGCCAGT
ratZ0-1        TCTTCGTAGCTCCAAGAGAAATCTTCGAAAAGCAGAGAGGACCTGTCAGGCAGCCAGT
dogZ0-1        TCTTCGCAGCTCCAAGAGAAATCTTCGAAAAGTAGAGAGGATTTGTGAGCTCAGCCAGT
chimpanzeeZ0-1 TCTTCGCAGCTCCAAGAGAAATCTTCGAAAAGCAGAGAGGATTTGTCCGCTCAGCCTGT
*****

mouseZ0-1      TCAAACAAAGTTCCAGCTTATGAAAGGGTTGTTCTTCGAGAAGCTGGATTCTAAGACC
ratZ0-1        TCAAACAAAGTTCCAGCTTATGAAAGGGTTGTTCTTCGAGAAGCTGGATTCTAAGACC
dogZ0-1        TCAAACAAAGTTCCAGCTTATGAAAGAGTTGTTCTTCGAGAAGCTGGATTCTGAGGCC
chimpanzeeZ0-1 TCAAACAAAGTTCCAGCTTATGAAAGAGTGGTTCTTCGAGAAGCTGGATTCTGAGGCC
*****

mouseZ0-1      TGTAAACCATCTTTGGACCAATAGCTGATGTTGCCAGAGAAAAGTTGGCAAGAGAGGAGCC
ratZ0-1        TGTAAACCATCTTTGGACCGATTGCTGATGTTGCCAGAGAAAAGTTAGCAAGGGAGGAGCC
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dogZ0-1      TGTAACATCTTTGGACCCATAGCTGATGTTGCCAGAGAAAAGCTGGCAAGAGAAGAACC
chimpanzeeZ0-1 TGTAACGATTTTGGACCAATAGCTGATGTTGCCAGAGAAAAGCTGGCAAGAGAAGAACC
***** ** ***** ** *****
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mouseZ0-1     AGATATCTATCAGATTGCAAAAAGTGAACACGAGACGCTGGGACTGACCATCGTAGCTC
ratZ0-1       AGACATTTATCAGATTGCAAAAAGTGAACACGAGATGCTGGAAGTGAACATCGGAGCTC
dogZ0-1       AGATATTTATCAGATTGCAAAAAGTGAACACGAGATGCTGGAAGTGAACATCGTAGCTC
chimpanzeeZ0-1 AGATATTTATCAAATTGCAAAAGAGTGAACACGAGACGCTGGAAGTGAACATCGTAGCTC
*** ** ***** ***** ***** ***** ***** ** ** *****

mouseZ0-1     TGGCATCATTCGCCTTCATACAATAAAGCAAATCATAGATCAGGATAAACATGCTTTATT
ratZ0-1       GGGCATTATTGCGCTTCATACAATAAAGCAAATCATAGATCAAGATAAACATGCTTTATT
dogZ0-1       TGGTATTATTGCTCTTCATACAATAAAGCAAATAATAGATCAGGACAAACATGCTTTATT
chimpanzeeZ0-1 TGGCATTATTGCGCTGCATACAATAAAGCAAATCATAGATCAAGACAAACATGCTTTATT
** ** ***** ** ***** ***** ***** ***** ** *****

mouseZ0-1     AGATGTAACGCCAAATGCGGTTGATCGTCTTAATTATGCGCAGTGGTATCCAATTGTTGT
ratZ0-1       AGATGTCACACCAAATGCAGTCGATCGCTTAATTATGCACAGTGGTATCGGATTGTTGT
dogZ0-1       AGATGTAACACCAAATGCAGTTGATCGTCTGAATTATGCCCAGTGGTATCCAATTGTAGT
chimpanzeeZ0-1 AGATGTAACACCAAATGCAGTTGATCGTCTTAACATGCCCAGTGGTATCCAATTGTTGT
***** ** ***** ** ***** ** ** ***** ***** ***** ***** **

mouseZ0-1     GTTCCTTAACCGTGACTCTAAGCAAGGTGTA AAAACAATGAGGATGAGGTTGTGTCGGA
ratZ0-1       GTTCCTTAACCGTGACTCTAAGCAGGGTGTA AAAACAATGAGGATGAGGCTATGTCCAGA
dogZ0-1       ATTCCTTAACCGTGATTCTAAGCAAGGTGTGAAAACATGAGGATGAGGCTATGCCCAGA
chimpanzeeZ0-1 ATTTCTTAACCGTGATTCTAAGCAAGGAGTAAAACAATGAGAATGAGGTTATGTCCAGA
** ***** ***** ** ** ***** ***** ***** * ** ** **

mouseZ0-1     GTCTCGGAAAAGCGCCAGGAAGCTATATGAACGCTCTCATAAGCTTCGTAAGAACAAATCA
ratZ0-1       GTCTCGGAAAAGTGCCAGGAAGCTATATGAACGGTCTCATAAACTTCGTA AAAAATAATCA
dogZ0-1       ATCTCGGAAAAGTGCCAGGAATTATATGAACGGTCTCATAAACTTCGTA AAAAATAATCA
chimpanzeeZ0-1 ATCTCGGAAAAGTGCCAGGAAGTTATATGAGCGATCTCATAAACTTCGTA AAAAATAATCA
***** ***** ***** ***** ** ***** ***** ***** ** *****

mouseZ0-1     CCATCTCTTCACAAC TACAATTAACCTAAACTCAATGAATGATGGTTGGTACGGTGCCCT
ratZ0-1       CCATCTTTTACAACCACAATTAACCTAAACTCAATGAATGATGGTTGGTATGGTGCCCT
dogZ0-1       CCATCTTTTACAAC TACAATTAACCTAAATTCAATGAATGATGGTTGGTATGGTGCAAT
chimpanzeeZ0-1 CCATCTTTTACAAC TACAATTAACCTAAATTCAATGAATGATGGTTGGTATGGTGCCCT
***** ** ***** ***** ***** ***** ***** ***** *****

mouseZ0-1     GAAAGAAGCGATTTCAGCAGCAACAGAACAGCTGGTGTGGGTCTCTGAGGGGAAGGCGGA
ratZ0-1       GAAAGAAGCGATTTCAGCAGCAACAGAACAGCTGGTGTGGGTCTCTGAGGGGAAGGCGGA
dogZ0-1       GAAAGAAGCAATTTCAGCAGCAACAGAACAGTTGGTATGGGTTTCTGAGGGGAAGGCGGA
chimpanzeeZ0-1 GAAAGAAGCAATTCAACAACAGCAAAACCAGCTGGTATGGGTTTCCGAGGGGAAGGCGGA
***** ***** ** ** ** ***** ***** ***** ** ***** *****

mouseZ0-1     TGGTGCTACAAGTGATGACCTTGATTTGCATGACGATCGTCTGCTACCTGTCAGCCCC
ratZ0-1       TGGTGCTACAAGTGATGACCTTGATTTGCATGATGATCGTCTGCTACCTGTCAGCCCC
dogZ0-1       TGGTGCTACAAGTGATGACCTTGATTTGCATGATGATCGTCTGCTACCTGTCAGCCCC
chimpanzeeZ0-1 TGGTGCTACAAGTGATGACCTTGATTTGCATGATGATCGTCTGCTACCTGTCAGCTCC
***** ***** ***** ***** ***** ***** ***** *****

mouseZ0-1     AGGTAGTGAGTACTCAATGTATAGCACGGACAGTAGACACACTTCTGACTATGAAGACAC
ratZ0-1       AGGTAGTGAGTACTCAATGTATAGCACGGACAGTAGACACACTTCTGACTATGAAGACAC
dogZ0-1       AGGTAGTGAATACTCAATGTATAGCACGGACAGTAGACACACTTCTGACTATGAAGACAC
chimpanzeeZ0-1 AGGTAGTGAATACTCAATGTATAGCACGGACAGTAGACACACTTCTGACTATGAAGACAC
***** ***** ***** ***** ***** ***** ***** *****

mouseZ0-1     AGATACAGAAGGCGGGGCTACACTGATCAAGAACTAGATGAAACTCTTAATGATGAGGT
ratZ0-1       AGATACAGAAGGCGGGGCTACACTGATCAAGAACTAGATGAAACTCTTAATGATGAGGT
dogZ0-1       AGATACAGAAGGCGGGGCTACACTGATCAAGAACTAGATGAAACTCTTAATGATGAGGT
chimpanzeeZ0-1 AGACACAGAAGGCGGGGCTACACTGATCAAGAACTAGATGAAACTCTTAATGATGAGGT
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mouseZ0-1     GGGGACTCCCCGGAGTCTGCCATTACAGGTCCTCTGAGCCTGTAAGAGAGGATTCTC
ratZ0-1       GGGGACTCCACCGGAGTCTGCTATTACAGGTCCTCTGAGCCTGTAAGAGAGGATTCTC
dogZ0-1       TGGGACTCCACCGGAGTCTGCCATTACAGGTCCTCTGAGCCTGTAAGAGAGGACTCTC
chimpanzeeZ0-1 TGGGACTCCACCGGAGTCTGCCATTACAGGTCCTCTGAGCCTGTAAGAGAGGACTCTC
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mouseZ0-1      TGGAAATGCATCATGAAAACCGAGACATACCCTCCTTACTCACCACAAGCGCAGCCACAAGC
ratZ0-1        TGGAAATGCATCATGAAAACCAAACATATCCTCCTTACTCACCACAAGCGCAGCCACAAGC
dogZ0-1        TGGAAATGCATCATGAAAACCAAACATATCCTCCTTACTCACCACAAGCGCAGCCACAAGC
chimpanzeeZ0-1 TGGAAATGCATCATGAAAACCAAACATATCCTCCTTACTCACCACAAGCGCAGCCACAAGC
*****
mouseZ0-1      TATTCATAGAATAGACTCCCCTGGACTTAAGCCAGCCTCTCAACAGAAAGCAGAAGCCTC
ratZ0-1        TATTCATAGAATAGACTCCCCTGGACTTAAGCCAGCCTCTCAACAGAAAGCAGAAGCCTC
dogZ0-1        AATTCATAGAATAGACTCCCCTGGATTAAACAGCTTCTCAACAGAAAGCAGAAGCCTC
chimpanzeeZ0-1 AATTCATAGAATAGACTCCCCTGGATTAAAGCCAGCCTCTCAACAGAAAGCAGAAGCCTC
*****
mouseZ0-1      ATCTCCAGTCCCTTACCTTTGCGCTGAAACAACCCAGCATCATCAGCCTCTGCAGTTAA
ratZ0-1        ATCTCCAGTCCCTTACCTTTGCGCTGAAACAACCCAGCATCATCAGCCTCTGCAGTTAA
dogZ0-1        ATCTCCAGTCCCTTACCTTTGCGCTGAAACAACCCAGCATCATCAACCTCTGCTGTTAA
chimpanzeeZ0-1 ATCTCCAGTCCCTTACCTTTGCGCTGAAACAACCCAGCATCATCAACCTCTGCTGTTAA
*****
mouseZ0-1      TCATAATGTCAGTGTAACCTAATGTCAGCCTGGAGGAGCCTGCCCCAGCCCTCCACCTC
ratZ0-1        GCATAATGTAATTTAACTAATGTCAACCTGGAGGAGCCACCCAGCTCCTCCACCTC
dogZ0-1        CCATAATGTAACCTTTAACTAATGTCAGACTGGAGGGGCTACCCAGCTCCTTCTACTTC
chimpanzeeZ0-1 TCATAATGTAATTTAACTAATGTGTCAGACTGGAGGAGCCACCCAGCTCCTTCCACCTC
*****
mouseZ0-1      GCACGCATCACAGCCTGGTTGTTTAGGAGCACCAAGTGTGAGGCAGCTCACGTAGGTCT
ratZ0-1        GCACGTATCACAGCTGATTGTTTAGGAGCACCAAGTCTGAGGCACCTCACACGATGCT
dogZ0-1        TTACTCACCACAAGCTGATTCTTTAAGAACACCAAGCACTGAGGCAGCTCACATAATGCT
chimpanzeeZ0-1 TTACTCACCACAAGCTGATTCTTTAAGAACACCAAGTACTGAGGCAGCTCACATAATGCT
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mouseZ0-1      CAGAGGTGAAGGACCACCATGCGCGCGCATGCAGACCCAGCAAAGGTGACAGGAAGGA
ratZ0-1        CAGAGACGAAGGAGTGTATTGCGCTGCGCATGTAGACCCAGCAAAGGTATATAGGAAGGA
dogZ0-1        AAGAGATCAAGAGCCATCATTGCGCTGCGCATGTAGAGCCAGCAAAGGTGTATAGAAAAGA
chimpanzeeZ0-1 AAGAGATCAAGAACCATCATTGTCGTCGTCATGTAGATCCAACAAAGGTGTATAGAAAAGA
*****
mouseZ0-1      GCCATATTCTGAAGAAATGATGAGACAAAACCATATTTTAAACAACCGACTCTTGGTCA
ratZ0-1        GCCATATCCTGAGGAAATGATGAGACAAAACCATATTTTAAACAGCCAGCTCTTGGTCA
dogZ0-1        TCCCTATCCTGAGGAAATGATGAGACGAACCATGTTTGAACAGCCAGCTGTTGGTCA
chimpanzeeZ0-1 TCCATATCCCGAGGAAATGATGAGGCAGAACCATGTTTGAACAGCCAGCCGTTAGTCA
** *** * ** ***** ** ***** **** ***** ***** ** *****
mouseZ0-1      CCCAGGGCAGAGGCCAGATAAAGAGCCAAATCTAGCCTATGAACCCCACTTCCATATAT
ratZ0-1        TCCAGGGCAGAGGCTGGATAAAGAGCCAAATCCAGCCTATGATCCCAACTTCCATATGT
dogZ0-1        CCCAGGGCAGAGGCCAGACAAAGAGCCTAATCTGAGCTATGAATCCCAACCCCATATGT
chimpanzeeZ0-1 CCCAGGGCACAGGCCAGACAAAGAGCCTAATCTGACCTATGAACCCCACTCCCATAGT
*****
mouseZ0-1      AGAAAAACAAGCCAGCAGAGACCTTGAGCAGCCGTCATACAGGTATGAGGTCTCAAGCTA
ratZ0-1        AGAAAAACAAGCCAGCAGAGACCTTGAGCAGCCACCATACAGGTATGAGTCTCAAGCTA
dogZ0-1        AGAAAAACAAGGCCAACAGAGACCTCGAGCAGCCACATACAGATACGACTCCTCAAGCTA
chimpanzeeZ0-1 AGAGAAACAAGCCAGCAGAGACCTCGAGCAGCCACATACAGATACGAGTCTCAAGCTA
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mouseZ0-1      CACAGACCAGTTTTCTCGGAACTATGACCATCGCCTACGGTTTGAAGATCGAATCCCTAC
ratZ0-1        CACAGACCAGTTTTCTCGGAACTATGACCATCGCCTACGATTTGAAGACCGAGTCCCTAC
dogZ0-1        TACAGACCAGTTTTCTCGAACTATGATCATCGTCTCCGCTATGAAGAGCGCATTCCAC
chimpanzeeZ0-1 TACGGACCAGTTTTCTCGAACTATGAACATCGTCTCGATACGAAGATCGCGTCCCAT
** *****
mouseZ0-1      CTATGAAGACCAGTGGTCATATTATGATGACAAACAGCCCTACCAACCTCGGCC—TTT
ratZ0-1        CTATGAAGACCAGTGGTCATATTATGATGACAAACAGCCCTACCAACTCGGCC—CTT
dogZ0-1        ATATGAAGAGCAGTGGTCATATTACGATGACAAACAGCCCTACCAAGCCTCGGCCCTCTCT
chimpanzeeZ0-1 GTATGAAGAACAGTGGTCATATTATGATGACAAACAGCCCTACCATCTCGGCCAGCTTT
*****
mouseZ0-1      TGAGAATCAGCATCCCCGAGACCTGGACTCCAGACAACATCCCGAAGAGGCTTCAGAACG
ratZ0-1        TGATACTCAGCATCCTCGAGACTTGGACTCCAGACAGCATCCTGAAGAGGCTTCAGAACG
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dogZ0-1      TGATAATCAGCACCCCTCGGGACCTTGACTCCAGACAGCATCCAGAAGAGTCCTCAGAAAG
chimpanzeeZ0-1 TGATAATCAGCACTCTCAAGACCTTGACTCCAGACAGCATCCGAAGAGTCCTCAGAACG
*** * ***** * * *** * ***** ***** ***** * ***** *

mouseZ0-1     AGGTTATTTCCAGCGTTTTGAAGAGCCAGCCCTCTGTGTCGACGACAGTAGAACACGCTA
ratZ0-1       AGGCTATTTCCAGCGTTTTGAAGAGCCGCGCCCTCTGCCATATGACAGTAGACCAGGCTA
dogZ0-1       AGGGTCTTACCCACGTTTTGAAGAGCCAGCCCTCTGTCTATGACAGCAGACCAGGCTA
chimpanzeeZ0-1 AGGGTACTTTCCACGTTTTGAAGAGCCAGCCCTCTGTCTTACGACAGCAGACCAGTTA
*** * * * ***** ***** * ** ***** ** * ** *

mouseZ0-1     TGAGCAGCTGCCTCGAACCTCTACTCTACGACATGAAGAGCAGCCAGCCCTGCATATGA
ratZ0-1       CGAGCAGCTGCCTCGAACCTCTACTCTCGACATGAAGAACAGCCAACCAGTGGATATGA
dogZ0-1       TGACCAGCCACCTAGAACCTCTACCTACGACACGAAGAGCAACCACTCCTGGATATGA
chimpanzeeZ0-1 CGAACAGGCACCTAGAGCATCCGCCCTGCGGCACGAAGAGCAGCCAGCTCCTGGGTATGA
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mouseZ0-1     GGTGCACAACAGGTACAGGCCAGAGGCACAGCCCTATTCTTCAACAGGCCCTAAGTCATC
ratZ0-1       GGTGCACAACAGGTACAGGCCAGAAGCACAGCCCTATGCTCCAGCAGGTCTAAGTCATC
dogZ0-1       CATGCATAACAGATACAGACCAGAAGCGCAGTCCTATTCTTCAGCAGGCCCTAAGGCATC
chimpanzeeZ0-1 CACACATGGTAGACTCAGACCGGAAGCCAGCCACCCTTCAGCAGGGCCCAAGCCCGC
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mouseZ0-1     TGAGCCCAAGCAGTACTTTGACCAGTACCCGGAAGTTATGAGCAAGTTCCACCACCAGG
ratZ0-1       TGAGCCGAAGCAGTACTTTGACCAGTACCCACGAAGTTATGAGCAAGTACCACCACCAGG
dogZ0-1       TGAACCGAAGCAGTATTTGACCAGTACCCACGAAGTTACGAGCAAGTACCATCACAGGG
chimpanzeeZ0-1 AGAGTCCAAGCAGTATTTGAGCAATATTCAGCGAGTTACGAGCAAGTACCACCCCAAGG
* * * ***** ***** ** * * * * * * * * * * * * * * *

mouseZ0-1     CTTTACCTCCAAAACAGGCCATTACGAGCCTCTCCATGGTGCTGCAGTTGTCCCTCCTCT
ratZ0-1       ATTTACCTCCAAAACAGGCCATTACGAGCCTCTCCATGGTGCTGCAGTTGTTCCCTCCTCT
dogZ0-1       ATTTTCTCGAAAGCCGGCCACTATGAGCCTCTCCATGGTGCTGCGGTTGTCCCTCCTCT
chimpanzeeZ0-1 ATTTACCTCTAGAGCAGGTATTTTGAAGCCTCTCCATGGTGCTGCAGCTGTCCCTCCGT
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mouseZ0-1     GATACCTTCTCTCAACAAAAGCCAGAAGTCTGCGCTCGGGTACCAAACACAGCCTCC
ratZ0-1       GATACCTTCTCTCAACATAAGCCAGAAGTTCTGCCCTCAGCTACCAAGCCACAGCCTCC
dogZ0-1       AATACCCGCATCTCAACATAAGCCAGAAGTTCTGCCTTCAAATACCAAACCTCTGCCTCC
chimpanzeeZ0-1 GATACCTTCATCTCAGCATAAGCCAGAAGCTCTGCCTTCAAACACCAAACCACTGCCTCC
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mouseZ0-1     ACCCCCAACCTAAGTGAAGAGGAGGAGGATCCAGCAATGAAACCACAGTCTGTGCTCAC
ratZ0-1       GCCCCAGCCCTAAGTGAAGAGGAGGAGGATCCAGCAATGAAACCACAGTCTGTGCTCAC
dogZ0-1       ACCCCCACTCTGACTGAAGAGGAGGAAGATCCAGCAATGAAACCCAGTCTGTACTCAC
chimpanzeeZ0-1 ACCCCCACTCAAACGAAGAAGAGGAAGATCCAGCAATGAAGCCACAGTCTGTACTCAC
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mouseZ0-1     CAGAGTCAAAATGTTTGAAGAACAAAGATCTGCGTCTTTGGAGAACAAGAAAGATGTGAA
ratZ0-1       CAGGGTCAAAATGTTTGAAGAACAAAGATCTGCGTCTCTGGAGAACAAGAAGGATGTGAA
dogZ0-1       TAGAGTAAAAATGTTTGAAGAACAAAGATCTGCATCATTGGAGAACAAGAAGGATGAAA
chimpanzeeZ0-1 CAGAGTTAAGATGTTTGAAGAACAAAGATCTGCATCCTTAGAGACCAAGAAGGATGTAAA
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mouseZ0-1     TGACACTGCCAGCTTCAAGCCTCCGGAAGTAGCATCTAAACCTCCAGGTGCTTCTCTTG
ratZ0-1       TGACACTGCCAGCTTTAAGCCTCCAGAAGTAGCATCTAAACCTCCAGGTGCTTCTCTTG
dogZ0-1       CCACACCGCTGGTTTTAAGCCTCCAGAGGTAGCTTCTAAACCTCCAGGTGCTCCCATCAT
chimpanzeeZ0-1 TGACACTGGCAGTTTTAAGCCTCCAGAAGTAGCATCTAAACCTTCAGGTGCTCCCATCAT
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mouseZ0-1     TGGCCCTAAACCTGTCCCTCAGAGTCAGTTTGTGAGCAGCAGAAAACGCTCTACAGGCT
ratZ0-1       TGGCCCTAAACCTGTTTCTCAGACTCAGTTTGTGAGCAGTACAAAACACTCTACAGGCT
dogZ0-1       TGGTCTTAAACCACTCCTCAGAATCAGTTCAGTGAACATGACAAAACACTGTACAGGAT
chimpanzeeZ0-1 TGGTCCCAACCACTTCTCAGAATCAGTTCAGTGAACATGACAAAACACTGTACAGGAT
*** ** ***** ***** ***** * * ***** * * ***** *

mouseZ0-1     CCCAGAGCCTCAGAAACCTCAAGTGAAGCCACCGAAGATATTGTTGATCAAATCATT
ratZ0-1       CCCAGAGCCTCAGAAACCTCAAGCGAAGCCACCTGAAGATATTGTTGATCAAATCATT
dogZ0-1       CCCAGAACCTCAAAAACCTCAGATGAAGCCACCGAAGATATTGTTGCGGTCAATCATT
chimpanzeeZ0-1 CCCAGAACCTCAAAAACCTCAACTGAAGCCACCTGAAGATATCGTTGCGTCAATCATT
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mouseZ0-1      CGACCCTGAAGAGGATGAAGAATATTACCGAAACAGCTCTCTACTTTGACCGAAGAAG
ratZ0-1        CGATCCTGAAGAGGATGAAGAGTATTACCGAAACAGCTCTCTACTTTGACCGGAGAAG
dogZ0-1        TGATCCCGAAGAGGATGAAGAATATTATCGAAAGCAGCTCTCTACTTTGACCGAAGAAG
chimpanzeeZ0-1 TGACCCTGAAGAAGATGAAGAATATTATCGAAAACAGCTGTCTACTTTGACCGAAGAAG
                ** ** ***** ***** ** ** ***** ** ***** *****

mouseZ0-1      TTTTGAGAGCAAGCCTTCTGCACATCTTCTGCTGGCCATCACTCAGAGCCTGCTAAGCC
ratZ0-1        TTTCGAGAGCAAGCCTCTGCACATATTCTGCTGGCCATCACTCAGAGCCTGCCAAGCC
dogZ0-1        TTTTGAAAACAAGCCTTCTACACACATTCTGCTGGCCATCTCTCAGAGCCTGCCAAGCC
chimpanzeeZ0-1 TTTTGAGAATAAGCCTCTGCACACATTGCCGCCAGCCATCTCTCCGAGCCTGCAAAGCC
                *** ** * ***** ** ***** ** * ** ***** ** ***** *****

mouseZ0-1      AGTCCATTCTCAGAGCCAGCCCAACTTCCTAGTTACTCTTCAAAGGGAAAA—CCCGA
ratZ0-1        AGTCCATTCTCAGAGTCAGCCGAATTTCTCTAGTTATTCTTCAAAGGGAAAA—CCCGA
dogZ0-1        AGTCTATTCTCAGAATCAAAACAATTTTCTAGTTATTCTTCAAAGGGAAAGTCTCTCTGA
chimpanzeeZ0-1 AGCTCATTCTCAGAATCAATCAAATTTTCTAGTTATTCTTCAAAGGGAAAGCCTCTCTGA
                ** ***** ** * ** ***** ***** ***** ** **

mouseZ0-1      AACTGATGCTGTGGATAGATCATTCAAGTGAAGAACGTTATGATCCAGCCAGGCCAGGCC
ratZ0-1        AACTGATGCTATGGATAGATCATTCAAGTGAAGAACGTTATGATCCAACCCAGGCCATGCC
dogZ0-1        AGCTGATGCCCTGATAGATCATTGGTGAGAAGCGCTATGAGCCAGTCCAGGCCACTCC
chimpanzeeZ0-1 AGCTGATGGTGTGGATAGATCATTGGCGAGAAGCGCTATGAACCCATCCAGGCCACTCC
                * ***** ***** ** ***** ** ***** **

mouseZ0-1      TCCTCCTCCTCCGTTGCCCTCAGAGTACAGCCAGCCAGCTCCACCTCTGTCCAGCTCTTC
ratZ0-1        TCCTCCTCCTCCGTTGCCCTCAGAGTACAGCCAGCCAGTCCGCTCTGTCCAACCTCTTC
dogZ0-1        CCCTCCTCCCCATTGCCCTCCAGTATGCCAGCCCTTCTCAGCCCGGTACAGCTCCTC
chimpanzeeZ0-1 CCCTCCTCCTCCATTGCCCTCCGAGTATGCCAGCCATCTCAGCTGTCAACAGCGCTC
                ***** ** ***** ***** ***** ** ** *** * **

mouseZ0-1      TCT——CCACATACATTCCAAGGGCGCCAGGGTGAAGGCAACTCAGTATCATTGGA
ratZ0-1        TCT——CCACATACATTCCAAGGGCGCCAGAGTGAAGGCAATTCCGTATCGTTGGA
dogZ0-1        TCTTGGCCTCCACACGATGCCAAGGGGGACATGGTGAAGTAATTCAATATCACTGGA
chimpanzeeZ0-1 TCT——CCACATACATTCTAAGGGAGCAGATGGTGAAGTAATTCAAGTGTATTGGA
                *** ***** ** * ** ***** ** ** * ** *****

mouseZ0-1      TTTTCAGAACTCATATATGTCCAAACCAGACCCACCCCATCTCAGAGTAAACCAGCAAC
ratZ0-1        TTTTCAGAACTCATATATCCAAACCAGACCCACCCCATCTCAGAGCAAAACCAGCAAC
dogZ0-1        CTTTCAGAACTCTTTAGTGTCCAAACCAGACCCACCTCCATCAGAGAATAAGCCAGCAAC
chimpanzeeZ0-1 TTTTCAGAACTCTTTAGTGTCCAAACCAGACCCAGCTCCATCTCAGAAATAAGCCAGCAAC
                ***** ** * ***** ***** ***** ***** ** *****

mouseZ0-1      TTTTCAGACCACTCAGTAAAGAGACCCCTCAG——ACTTTCTATCCGCAGAAAAGTTT
ratZ0-1        TTTTCAGACCACTCAGTAAAGAGACCCCTCAG——ACCTTCTATCCGCAGAAAAGTTT
dogZ0-1        TTTTCAGACCACTCAGTAAAGAGATCTGTTCACTCTACTTTCTATCCAGAAAAGTTT
chimpanzeeZ0-1 TTTTCAGACCACTCAGTAAAGAGATCTGTTCACTCTACTTTCTATCCAGAAAAGTTT
                *** ***** ** * ** ***** ** ***** ***** *****

mouseZ0-1      CCCAGACAAAGCTCAGTTAAGCGAGCTGAGCAGACTCAGAAAACCATCACTCCGGTGTG
ratZ0-1        CCCAGACAAAGCTCAGTTAATGGAGCTGAGCAGACTCAGAAAACCATCACTCCAGCATA
dogZ0-1        CCCAGATAAAGCTCAGTTAATGGAGCTGAACAGACTCAGAAAACGGTCACTCCAGCATA
chimpanzeeZ0-1 TCCAGATAAAGCCAGTTAATGGAAGTGAACAGACTCAGAAAACAGTCACTCCAGCATA
                ***** ***** ***** ** ***** ***** ***** *****

mouseZ0-1      CAATCGATTACACCAAAGCGGTACACAAGTTCTGCCCGGCCATTTGAACGCAAGTTTGA
ratZ0-1        CAACCGATTACACCAAAGCGGTACACAGCTCTGCCCGGCCATTTGAACGCAAGTTTGA
dogZ0-1        TAATCGATTACACCAAACCATACACAAGTTCTGCCCGGCCATTTGAACGCAAGTTTGA
chimpanzeeZ0-1 CAATCGATTACACCAAACCATATACAAGTTCTGCCCGGCCATTTGAACGCAAGTTTGA
                ** ***** ***** ** * ** ***** ***** ***** *****

mouseZ0-1      AAGTCCGAAGTTCAACCATAATCTTCTGCCAAGTGAAGTGTACATAAACCTGAATTGTC
ratZ0-1        AAGTCCAAAGTTCAACCATAATCTTCTGCCAAGTGAAGTGTACATAAACCTGAATTGTC
dogZ0-1        AAGTCTAAATTTCAACCATAATCTTCTGCCAAGTGAAGTGTACATAAACCTGACTTGTC
chimpanzeeZ0-1 AAGTCTAAATTTCAATCAATCTTCTGCCAAGTGAAGTGTACATAAACCTGACTTGTC
                ***** ** ***** ** ***** ***** ***** ***** *****

mouseZ0-1      TTCAAAAACCTCCCACTTCCCAAAAACCTCTTATGAAAGCTCATAGTTCAACACAGCCTCC
ratZ0-1        TTCAAAAACCTCCCACTTCCCAAAAACCTCTCATGAAGGCTCATAGTTCCACACAGCGGCC
```



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dogZ0-1      TTCAAAAGCCCCTGCTTCTCCCAAGACTCTTGCAAAAGCACATAGTCGAGCACAGCCTCC
chimpanzeeZ0-1 TTCAAAAAGCTCCCACTTCTCCAAAAGCTCTTGAAATCGCACAGTTTGGCACAGCCTCC
***** * ** ***** ** ** ***** ** * ** ***** ***** **

mouseZ0-1     AGAGTTTGGCAGTGGAGTTGAAACTTTCTCTGTTACACAGATAAGCCTAAATATCAAAT
ratZ0-1       TGAGTTTGACAGTGGAGTCGAGACTTTCTCTGTTACACAGATAAGCCTAAATATCAAAT
dogZ0-1       TGAGTTTGACAGTGGAGTTGAAACTTTCTCCATCCATGCAGATAAACCTAAATATCAAAT
chimpanzeeZ0-1 TGAGTTTGACAGTGGAGTTGAAACTTTCTCTATCCATGCAGAGAAGCCTAAATATCAAAT
***** ***** ** ***** * ** ***** ** *****

mouseZ0-1     GAATAATATCAGCACCATGCCTAAAGCTGTCCTGTGAGTCCTTCAGCTGTGGAAGAAGA
ratZ0-1       AAATAATATCAGCACCATGCCTAAAGCTGTTCTGTGAGTCCTTCAGCTGTGGAAGAAGA
dogZ0-1       GAACAATCTCAGCACAGTGCCTAAAGCTATTCTGTGAGCCCGTCAGCTGTGGAAGAAGA
chimpanzeeZ0-1 AAATAATATCAGCACAGTGCCTAAAGCTATTCTGTGAGTCCTTCAGCTGTGGAAGAAGA
** ** ***** ***** * ***** ** *****

mouseZ0-1     TGAAGATGAGGATGGTCATACTGTAGTGGCTACAGCTCGTGGCATTTTAACAGCAATGG
ratZ0-1       TGAAGATGAGGATGGTCATACTGTAGTGGCTACAGCCCGCGGCATTTTAACAGCAATGG
dogZ0-1       TGAAGATGAGGATGGCCATACTGTGGTGGCCACAGCCCGAGGCGTCTTTAAACAACATGG
chimpanzeeZ0-1 TGAAGATGAAGATGGTCATACTGTGGTGGCCACAGCCCGAGGCATTTAACAGCAATGG
***** ***** ***** ***** ***** ** ** * ***** *****

mouseZ0-1     TGGTGTGTTGAGTTCATAGAAACCGGTGTTAGTATAATTATCCACAAGGAGCCATTCC
ratZ0-1       CGGTGTGTTGAGTTCATAGAAACTGGTGTAGTATAATTATCCACAAGGAGCCATTCC
dogZ0-1       TGGGTGTGTTGAGTTCATAGAAACTGGCGTCAGTATCATCATCCCCAAGGAGCCATTCC
chimpanzeeZ0-1 GGGCGTGTGAGTTCATAGAAACTGGCGTTAGTATAATTATCCCTCAAGGAGCCATTCC
** ** ***** ***** ** ** ***** ** ***** *****

mouseZ0-1     TGAAGGAATTGAGCAAGAAATCTATTTCAAAGTCTGCAGAGACAATAGCATTCTCCACC
ratZ0-1       TGAAGGAATTGAGCAAGAAATCTATTTCAAAGTCTGCAGAGACAATAGCATCCTCCACC
dogZ0-1       GGAGGGAGTGAACAGGAAATCTACTTCAAGGTCTGCCGAGACAACAGCATCCTCCCCC
chimpanzeeZ0-1 CGAAGGAGTTGAGCAGGAAATCTATTTCAAGGTCTGCCGGGACAACAGCATCCTTCACC
** ** * ** ** ***** ***** ***** * ***** ***** ** **

mouseZ0-1     TTTAGATAAAGAGAAAGGTGAAACTCTGCTGAGCCCCCTAGTGATGTGTGGGCCCCATGG
ratZ0-1       TTTAGATAAAGAGAAAGGTGAAACTCTGCTGAGCCCCCTAGTGATGTGCGGGCCCCATGG
dogZ0-1       TTTAGATAAAGAGAAAGGTGAGACACTGCTGAGCCCCCTAGTGATGTGTGGGCCCCATGG
chimpanzeeZ0-1 TTTAGATAAAGAGAAAGGTGAAACACTGCTGAGTCCTTTGGTGATGTGTGGTCCCATGG
***** ***** ***** ***** * ***** ** *****

mouseZ0-1     CCTCAAGTTCCTGAAGCCCGTGGAGCTACGCTTGCCACACTGTG_____
ratZ0-1       CCTCAAGTTCCTGAAGCCTGTGGAGCTACGCTTGCCACACTGTG_____
dogZ0-1       CCTCAAGTTCCTGAAGCCCGTGGAGCTGCGCTTGCCACACTGTGCGTCCATGACTCCTGA
chimpanzeeZ0-1 CCTCAAGTTCCTGAAGCCTGTGGAGCTGCGCTTACCACACTGTGCGTCCATGACTCCTGA
***** ***** ***** ***** *****

mouseZ0-1     _____ACCTAAACCTGGCA
ratZ0-1       _____ACCTAAACCTGGCA
dogZ0-1       CGGTTGGTCTTTTGTCTAAATCATCCGACTCCTCGTGGGTGATCCTAAACCTGGCA
chimpanzeeZ0-1 CGGTTGGTCTTTTGTCTAAATCATCCGACTCCTCGTGGGTGATCCTAAACCTGGCA
* ***** *****

mouseZ0-1     AAACAAGTGTCTTCTGGAGATCCGAATTACCTTGTGGAGCCAAGTGTGTTTCTGTCT
ratZ0-1       AAACAAGTGTCTTCTGGAGATCCGAATTACCTTGTGGAGCCAAGTGTGTTTCTGTCT
dogZ0-1       AAACAAGTGTCTTCTGGAGATCCAAATTACCTTGTGGAGCAAAGTGTGTTTCTGTCT
chimpanzeeZ0-1 AAACAAGTGTCTTCCGGAGATCCAAATTATCTGTTGGAGCAAAGTGTGTTTCTGTCT
***** ***** ***** ** ***** *****

mouseZ0-1     GATTGACCACTTTTAATTCTTAGTGTATAGGAAGTGGACTAAGCAATGTGAACGTGGATT
ratZ0-1       GATTGACCACTTTTAATTCTTAGAGTCTAGCAGTGGACTAAGCAGTGTGAACATGGATT
dogZ0-1       GATTGACCACTTTTAATTCTTAAATATAGGAAGTGGATTAAATAATGTGAAAGTGGGT
chimpanzeeZ0-1 TATTGACCACTTTTAAGTCTTGAATATAGGAAGT-----AAATAATGTGAAAGTGGATT
***** ***** ***** * ** * ** ** * ***** ** **

mouseZ0-1     GAACCTACTAAATCTAAATGGAACCACTCTAATGAGTATTATA-TTTTCTTAGAATTTAT
ratZ0-1       GAACCTACTGAA-----TGAACCACTCTAATGAGTATTCTA-TTTTCTTAGAATTTAT
dogZ0-1       AAACCTACTAAATCTAAATGGAAGCACTCTATCAAGTATTATACTTTCTTAGAATTTAT
chimpanzeeZ0-1 AAACCTA-----ATCTAAATGGAACCACTCTATCAAGTATTATACTTTTTAGAGTTGAT
***** * ***** ***** ***** ** ** ***** ** **

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mouseZ0-1      ACTGCAATTG-GTAGTATTAAGCATT-TTTGGAAGTATGAAGGTTAGCGAGCATGCC
ratZ0-1        ACTGCAGTTA-GTAGTATTAACATT-TTTGGAAGTATAAGGTTAGTGAGCATGCC
dogZ0-1        ACTGCAGTTC-TTAGTATTAAGCATT-TTCTGAACAGATGAAGATTAGTGAGCATGCC
chimpanzeeZ0-1 ACTACAGTTTGTAGTATGAAGCATT-TTTGGAAGTATAAGATGAGTGAGCATGCC
*** ** *      ***** ** ***** ** ***** ** * ** *****

mouseZ0-1      CTGAGCCACGGTCAGAAAGCATGCTACAAGCTATGTGTTATTGAGTGA-AGAACTGTCAG
ratZ0-1        CTGAACCACGATCAGAAAACATGCTACAAGCTGTGTGTTATTGAGTGA-AGAACTGTCAG
dogZ0-1        CTGCACCGTGGTCAGAAAACATGCTGCAGACTGCGTGTGTTGATGGA-AAAACCGTC-A
chimpanzeeZ0-1 CTGAACCATGGTCGAAAACATGCTACACACTGCATGTTGTGATTGACGGGACTGTT-G
*** ** *      ***** ** ***** ** ***** ** * ** *****

mouseZ0-1      GCATTGGCTAGAGGTTCAAAGATATTTTGTGTTGTAATGATTTTGTGTA-CTTTTTTATG
ratZ0-1        GCATTGGCTAGAGGTTCAAAGATATTTT-GCTTTGTAATGATTTTGTGTA-CTTTTTTATG
dogZ0-1        GTATTGGCTGGAGGGTCAGAGATGGTTT-GCTTTGTAATGATTTTGTGTA-CTTTTTTACA
chimpanzeeZ0-1 GTATTGGCTAGAGGTTCAAAGATATTTT-GCTTTGT---GATTTTGTGTAATTTTATC
* ***** ** ***** ** ***** ** ***** ** *****

mouseZ0-1      GTCACCTGCTTAACCTTCACATACTGATTTCCGTTAAAAATACCAGCCAGTAAATGGGGGTG
ratZ0-1        GTCACCTGCTTAACCTTCACATACTGATTTCCGTTAAAAATACCAGCCAGTAAATGGGGGTG
dogZ0-1        GTCACCTGCTTA-CTTCAC---TGATTTCCGTTAAAA-TACCAGCCAGTAAATGGGG-TG
chimpanzeeZ0-1 GTCACCTGCTTAACCTTCACATATTGATTTCCGTTAAAA-TACCAGCCAGTAAATGGGGGTG
***** ** ***** ** ***** ** ***** ** *****

mouseZ0-1      CATTTGAGTTCTGTTCTTTCCAAAGTACACT---CAAAGTTTATTATGGCCTTGGCCTA
ratZ0-1        CATTTGAGTTTGTCTTTCCAAAGTACACT---CAACCTTTACTATGGCCTTGGCCTA
dogZ0-1        CATTTGAGTTTATTCTTTCCAAAGTACACTGTTTCAAAGTATTATGGCCTGCTTG
chimpanzeeZ0-1 CATTTGAGGTCTGTTCTTTCCAAAGTACACTGTTTCAAAGTATTATGGCCTGGCCTA
***** * * ***** ** ***** ** ***** ** *****

mouseZ0-1      GCATAC---ACATTTTATTTATTATACATGAGGTAATGTGCACACATTTTACAAAT
ratZ0-1        GCATAC---ACATTT-ATTTTATTATGCATGAGGTAATGTGCACACATTTTACAAAT
dogZ0-1        GCATAC---ACATTTTATTTATTATGCATGAGGTAATATGCACACATTTAAAA-AAT
chimpanzeeZ0-1 GCATACGTACACATTTTATTTATTATGCATGAAGTAATATGCACACATTTTAA-AAT
***** ***** ***** ***** ***** ***** ***** *

mouseZ0-1      GCACCTGGAATATATAA-CCAGTATAGTGGATTAAACAGAAATGTACAGCAGGGGGA-TT
ratZ0-1        GCACCTGGAATATATAA-CCAGTGTAGTGGATTAAACAGAAATGTACAGCAGGGGGA-TT
dogZ0-1        ATACCTGGAGCATATAAACCAAGTGTAGTAGATTAAACAGAAATGTACAGCAAGGGGAAT
chimpanzeeZ0-1 GCACCTGGAATATATAA-CCAGTGTGTTGGATTAAACAGAAATGTACAGCAAGGAGA-TT
***** ***** ***** * ** ***** ***** ***** **

mouseZ0-1      TATAACTTGGGGAGGGAGGG-----TCAAATGAAGACAATTACTTATTG
ratZ0-1        TATAACTTGGGGAGGGAGGG-----GCAAATGAAGACAATTCCTTATTG
dogZ0-1        TGTAGCTTTGGGGGGGTGGGGGGGATGGTAGGGAAGTCAAGTGAAGACAATTACTTATTG
chimpanzeeZ0-1 TATAACTTGGGGAGGGGTG-----AAGTGAAGACAGTGACTTACTG
* ** *      *** ** *      ** ***** ** *****

mouseZ0-1      TATATGAAAACACATTTCTTTAGGGAAGGACACCAAAGCATGTGAGCCCGGTTT-ATGG
ratZ0-1        TATATGAAAACACATTTCTTTAGGGAAGGACACCAAAGCATGTGAGCCAGTTCCATGG
dogZ0-1        TATATGAAAACACATTTT-TTAGGGAAGGACACCAAAGCATGTGAGACTGGTTCTGTGG
chimpanzeeZ0-1 TACATGAAAACACATTTTCTTTAGGGAAGGATACAAAAGCATGTGAGACTGGTTCCATGG
** ** *      ***** * ***** ***** ***** *****

mouseZ0-1      CCTCT---GAATCTATAAATTAAC-ATATCACCACAGACATG-TAACCAGCAGGAATGCCT
ratZ0-1        CCGCT---GAATCTATAAATTAAC-ATATCACCACAGACATC-CAACCAGCAGGAATGCCT
dogZ0-1        CCTCTTTGGATCTATAAATTAACCATATCACCACAGACATACTAACCAGCAGGAATGCCT
chimpanzeeZ0-1 CCTCTTCACATCTCTAATTCACCATATTACCACAGACATACTAACCAGCAGGAATGCCT
** ** *      ***** ** ***** ***** ***** *****

mouseZ0-1      TACCCTAGTGGGTTTAATTCCTCCATCATT-TCGCTGTGTATTACTAAGTTTTATGAGT
ratZ0-1        TACCCTCATGGTTTTTCAATCTTAGATCATT-TCGCTGTGTAGTACTAAGTTTTATGAGT
dogZ0-1        TACCCTCATATTTTAAATTCCTTAGATCATTCTCTCTGTGTATTACTAAGTTTATGAGT
chimpanzeeZ0-1 TACCCTCATGTTCCTAATTCCTAGCTCATTCTCCCTGTGT---TACTAAGTTTTATGGCT
***** *      * ***** ***** ** ***** ***** *****

mouseZ0-1      TCTGTGCAT-ATCTAGATACTGTACCATGGAAAAGACTGAGTAGATTGTGGACTTGATGG
ratZ0-1        T-TGTGCGT-ACCTAGATACTGTATCATGGAAAAGACTGAGGAAATTGTGGACTTGATGG

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dogZ0-1      TTTGTGCAC-ATCTAGTTACTGTATCATGAAAAAGATTGAGTAAATTGTGGATTGGTGG
chimpanzeeZ0-1 TTTGTGCATTATCTAGATACTGTATCATGACAAAGACTGAGTACATTGTGCATTGGTGG
* ***** * ***** ***** ***** ***** ***** * *****

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mouseZ0-1    TTTCAGAAATGTGCAAATTACCTGGAAGAAAATAATGGTGTGACTTAA-ATATTTTTTT
ratZ0-1      TTTCGGAAATGTGTAATCACCTGGAAGAAAGTAATGGTGTGACTTAA-ATATTTTTTT
dogZ0-1      TTTCAGAAATGTATAA-TCACCCAGA-GAAAATAATGGTGTGATTGGGGATTCCCCACC
chimpanzeeZ0-1 TTTCAGAAATGTGTTA-TCACCCAGAAGAAAATAGTGGTGTGATTGGGGATATTTTTTT
**** ***** * * **** ** ***** ** ***** ** ***** **

```

```

mouseZ0-1    -----GA-----CAGGGGGAG-----TGGCAGTCTTCTG-
ratZ0-1      TT-----GA-----CAAGGGAGAGTGGTGGTGGTCTTCTG-
dogZ0-1      CACCACCCCCAC-----CAAGGGGCAG-----TGGTGGTTTTCTG
chimpanzeeZ0-1 CTTTTCTTTCTTTTTTTTTTTTTTTTTTTTGAACAAGGGGCAG-----TGGTGGTTTTCTGT
                      ** ***                *** ** **

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```

mouseZ0-1    TTCTTTGGGCTGTGCATCTGAGATGTTTGATGCTTTCAGGACGCATGTACATAATGCGTG
ratZ0-1      TTCTTTGGGCTATGCATCTGAGATGTTTGATGTGTTCAAGGACGCATGTACATAATGCGTG
dogZ0-1      TTCTTTGGCTATGCATTTGAAAATTTTGACATTTTAAGGATGCTTGTACATAATGCGTG
chimpanzeeZ0-1 TCTTTCTGGCTATGCATTTGAAAATTTTGATGTTTAAGGATGCTTGTACATAATGCGTG
* ** ***** ***** ** * ***** ** ***** ** *****

```

```

mouseZ0-1    CATACCACTTTTGTCTTGTTTGTAAATTAACCTTTTATAAACTTTACCTTTTT-ATACA
ratZ0-1      CATACCACTTTTGTCTTGTTTGTAAATTAACCTTTTATAAACTTTACCTTTTT-ATACA
dogZ0-1      CATACCACTTTTGTCTTGTTTGTAAATTAACCTTTTATAAACTTTACCTTTTTTATACA
chimpanzeeZ0-1 CATACCACTTTTGTCTTGTTTGTAAATTAACCTTTTATAAACTTTACCTTTTTTATACA
*****

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```

mouseZ0-1    TAAACAGAACCAAGTTTCT-AAGGCTACCTTTGTATT-CTCTCCTGTACCTCTTGAGCCT
ratZ0-1      TAAACAGAACCGAGTTTCT-AAGGCTACCTTTGTATT-CTCTCCTGTACCTCTTGAGCCT
dogZ0-1      TAAACAAAACCGAGTTTCTTAAGGCTACCTTTGTATTCTCTCCTGTACCTCTTGAGCCT
chimpanzeeZ0-1 TAAACAAGACCAGTTTCTAAGGCTACCTTTGTATT-CTCTCCTGTACCTCTTGAGCCT
***** ** ***** *****

```

```

mouseZ0-1    TGAACTTTGACCTCTGCAGCAATAAAGCAGCATTCTA-CACATACAAGGTCATTTTT
ratZ0-1      TGAACTTTGACCTCTGCAGCAATAAAGCAGCATTCTA-CACATATAAGGTCATTTTT
dogZ0-1      TGAACTTTGACCTCTGCAGCAATAAAGCAGCATTCTATGACACATACAAGGTCATTTTT
chimpanzeeZ0-1 TGAACTTTGACCTCTGCAGCAATAAAGCAGCGTTCTATGACACATGCAAGGTCATTTTT
***** *****

```

```

mouseZ0-1    CT-AAGAAAAAGAATGCACAGAGTTGTACATTTTAAAGTGCTGCATTTAAAGATACAG
ratZ0-1      TT-AAGAAAAAGAATGCACAGAGTTGTACATTTTAAAGTGCTGCATTTAAAGATACAG
dogZ0-1      TA-AAGAAAAAGAATGCACAGAGTTGTACATTTTAAAGTGCTGCATTTAAAGATACAG
chimpanzeeZ0-1 TTTAAGAAAAAGGATGCACAGAGTTGTACATTTTAAAGTGCTGCATTTAAAGATACAG
*****

```

```

mouseZ0-1    TTACTC-----TAGTTTGATTAATTCCTTGCAAAGTATCCCTTCTGTAAAATTTGT
ratZ0-1      TTACTC-----TAGTTTGATTAATTCCTTGCAAAGTATCCCTTCTGTAAAATTTGT
dogZ0-1      TTACTCAGAAATTCCTAGTTTGATTAATTCCTTGCAAAGTATCCTGACTGTAA-TTTGT
chimpanzeeZ0-1 TTACTCAGAAATTCCTAGTTTGATTAATTCCTTGCAAAGTATCCT-ACTGTAA-TTTGT
***** *****

```

```

mouseZ0-1    GATACAATACTGTGCCCTAAAGTGATTTTTTTTACTAATAGACAGTTTATTATGGCACAT
ratZ0-1      GATACAATGCTGTGCCCTAAAGTGATTTTTTTTACTAATAG-----TTTATTATGGCACAT
dogZ0-1      GATACCATGCTGTGCCCTAAAGTGATTTTTTTTACTAATAGACAATTTATTATGGCACAT
chimpanzeeZ0-1 GATACAATGCTGTGCCCTAAAGTGATTTTTTTTACTAATAGACAATTTATTATGGCACAT
***** ** *****

```

```

mouseZ0-1    CAGCACGATTCTGTTTAGATAATACACCACTACATTCTGTTAATAA-TCAGTAGGTGTG
ratZ0-1      CAGCACGATTCTGTTTAGATAATACACCACTACATTCTGTTAATAA-TCATTAGGTGTG
dogZ0-1      CAGCACGATTCTGTTTAGATAATACACCACTACATTCTGTTAATCAATCATTAGGTGTG
chimpanzeeZ0-1 CAGCACGATTCTGTTTAGATAATACACCACTACATTCTGTTAATCA-----TTAGGTGTG
***** *****

```

```

mouseZ0-1    AAAGGATTCTTTTGTGGTTATTAATAAAAAAATCTCAAATTTCTAAATCTGCAAGAATAA
ratZ0-1      AAAGGATTCTTTTGTGGTTATTAATAA-----ATCTCAAATTTCTAAATCTGCAAGAATAA
dogZ0-1      ACTGAATTTCTTTGCAGTTATTAATAA-----TCTCAAATTTCTAAATCTGCGG-AATAA
chimpanzeeZ0-1 ACTGAATTTCTTTGCCGTTATTAATAA-----TCTCAAATTTCTAAATCTCCAA-AATAA
* * ***** ***** *****

```

```

mouseZ0-1      AACTTTTTTAAAT-----
ratZ0-1        AACTTTTTTAAATACAGT-----
dogZ0-1        AACTTTTTTAAATAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA-----
chimpanzeeZ0-1 AACTTTTTTAAATAAAGTGCTGGCTTGGTCTGTTTGCCCACTGTTTCTAGTTTCATGCA
*****

```

```

mouseZ0-1      -----
ratZ0-1        -----
dogZ0-1        -----
chimpanzeeZ0-1 GCTTTATAATCCTGTTTTAAATCCTGCACACAAATCCCTATCAGCCAGCGTCACCTACC

```

```

mouseZ0-1      -----
ratZ0-1        -----
dogZ0-1        -----
chimpanzeeZ0-1 ACCTCGTGTCTGGTGTTCATGCAGAATTTCTCCCCTTGGCCAGCATGTACAGATGGGT

```

```

mouseZ0-1      -----
ratZ0-1        -----
dogZ0-1        -----
chimpanzeeZ0-1 GGGCAGTGCTCATCTGAAGGGCTCAGACTGAAGTGGGCAGAAGGACCTGGAGACAGAGT

```

```

mouseZ0-1      -----
ratZ0-1        -----
dogZ0-1        -----
chimpanzeeZ0-1 GGGAGAAAGCAGCAGGCCGACTTCCCCCTGTGGGTAAACACACACCCCTGCGTGGAGAAA

```

```

mouseZ0-1      --
ratZ0-1        --
dogZ0-1        --
chimpanzeeZ0-1 CA

```

query. dnd

```

(
(
mouseZ0-1:0.04818,
ratZ0-1:0.01034)
:0.06105,
dogZ0-1:0.04310,
chimpanzeeZ0-1:0.05771);

```

***** [tree] *****

options = -type=dna -tree -outputtree=phylip -kimura -toss gaps

CLUSTAL W (1.83) Multiple Sequence Alignments

Sequence type explicitly set to DNA

Sequence format is Clustal

```

Sequence 1: mouseZ0-1      7502 bp
Sequence 2: ratZ0-1        7502 bp
Sequence 3: dogZ0-1        7502 bp
Sequence 4: chimpanzeeZ0-1 7502 bp

```

query. ph

```

(
(
mouseZ0-1:0.03100,
ratZ0-1:0.02847)

```

RESULT OF CLUSTALW

13/13

:0.05770,
dogZ0-1:0.04775,
chimpanzeeZ0-1:0.04326);